



Advice to decision maker on unconventional gas project

IESC 2025-153: Mahalo North Coal Seam Gas Project (EPBC 2023/09689) – New Development

Requesting agency	The Australian Government Department of Climate Change, Energy, the Environment and Water
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Advice stage	Assessment

The Independent Expert Scientific Committee on Unconventional Gas Development and Large Coal Mining Development (the IESC) provides independent, expert, scientific advice to the Australian and state government regulators on the potential impacts of unconventional gas and large coal mining proposals on water resources. The advice is designed to ensure that decisions by regulators on unconventional gas or large coal mining developments are informed by the best available science.

The IESC was requested by the Australian Government Department of Climate Change, Energy, the Environment and Water to provide advice on the Comet Ridge Mahalo North Pty Ltd's Mahalo North CSG Project in Queensland. This document provides the IESC's advice in response to the requesting agency's questions. These questions are directed at matters specific to the project to be considered during the requesting agency's assessment process. This advice draws upon the available assessment documentation, data and methodologies, together with the expert deliberations of the IESC, and is assessed against the IESC Information Guidelines (IESC 2024).

Summary

The Mahalo North CSG Project (the 'project') is a coal seam gas (CSG) project proposed by Comet Ridge Mahalo North Pty Ltd in the Bowen Basin, Queensland. The project will include the construction, decommissioning and rehabilitation of 68 CSG production wells (34 vertical and 34 lateral) and supporting infrastructure, including water- and gas-gathering pipelines, a gas compression facility and a water treatment plant (Epic 2024a, p. 17).

Within the project area, several species listed by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are known or likely to occur, including koala (*Phascolarctos cinereus*), ornamental snake (*Denisonia maculata*), grey snake (*Hemiaspis damelii*) and white-throated snapping

turtle (*Elseya albagula*) (Epic 2024a, p. 70). There are also two Threatened Ecological Communities (TECs): Brigalow (*Acacia harpophylla* dominant and co-dominant) and Semi-evergreen Vine Thicket.

The proponent concludes that there is no hydraulic connection between the target coal seam formation and upper layer aquifers and predicts that groundwater drawdown resulting from project activities will not impact surface and regional water resources (Epic 2024a, p. 120). However, evidence provided by the proponent to support this statement does not clearly demonstrate a lack of hydraulic connection between the target formation and the aquifer-bearing overlying strata. It remains unclear whether groundwater drawdown from the project could impact shallow aquifers that may contain subterranean groundwater-dependent ecosystems (GDEs) and support terrestrial and aquatic GDEs, some of which are likely to be habitat for EPBC Act-listed species such as the white-throated snapping turtle.

Key potential impacts from this project are:

- spills, leaks and overflows of contaminated water from the water management system into the surrounding environment, including seepage into the shallow aquifers and flow into receiving watercourses, impacting EPBC Act-listed species (e.g., white-throated snapping turtle) and riparian vegetation;
- groundwater drawdown in the target formation propagating into the overlying aquifers, thus lowering the water table, impacting GDEs within and surrounding the project area and altering surface water-groundwater interactions along the Comet River and Humboldt Creek; and
- cumulative impacts of the individual project and with the proposed and existing projects surrounding the project area.

Additional work to address these key potential impacts is summarised below.

- Collection of adequate site-specific baseline groundwater data to characterise the existing environment to improve understanding of potential groundwater impact pathways and inform impact assessment modelling.
- An impact assessment of groundwater drawdown in the Tertiary and alluvial aquifers to the baseflow of the Comet River and Humboldt Creek if the hydraulic connection between target formation and upper aquifers is proven to exist.
- Characterisation of the alluvial aquifer and groundwater-surface water interactions along Humboldt Creek and the Comet River to improve conceptualisation and understand potential impact pathways to riparian vegetation and refugial habitat for the white-throated snapping turtle.
- Stormwater modelling to inform design capacity of produced water and brine storages, and to ensure rain events will not overtop storages and release contaminated water into the environment.
- Water quality baseline data to evaluate risks associated with accidental spills or leakage of produced water from the water management system.
- Further baseline sampling and ongoing monitoring of potential subterranean, terrestrial and aquatic GDEs in and surrounding the project area.
- Development of project-specific and appropriately targeted monitoring and mitigation plans, including defined triggers and responses.

- Evidence-based conceptualisation of both the baseline conditions and the potential impact propagation pathways to inform the impact assessment of possible project-specific and cumulative impacts, specifically to alluvial groundwater, potential watercourse refugial pools and GDEs.

Context

Comet Ridge Mahalo North Pty Ltd.'s proposed coal seam gas (CSG) project is located 45 km north of Rolleston and 70 km southeast of Emerald, in south-central Queensland (Epic 2024a, p. 17). Located on the PL 1128 application and covering an area of 14,000 ha (Epic 2024, p. 17), it is immediately adjacent to the currently approved Mahalo project (PL 1082 and PL 1083) (Epic 2024a, Figure 4, p. 34). Sixty-eight CSG wells will target the interbedded coal seams of the Bandanna Formation, 120 to 200 m below ground level (RDM Hydro 2024a, p. 84). Above the target formation is the Rewan Group, described as a regional-scale aquitard (RDM Hydro 2024a, pp. 32 and 84), and the Tertiary fractured rock aquifer which is hydraulically connected to the surficial Quaternary alluvium deposits associated with the watercourses within and surrounding the project area (RDM Hydro 2024a, Table 4, p. 34).

Gas and water management infrastructure will be constructed, including water- and gas-gathering pipelines, a gas compression facility, access tracks, a water treatment plant, and above-ground wastewater storage tanks (Epic 2024a, p. 1). No hydraulic stimulation (fracturing) is proposed (Epic 2024a, p. 27). The water- and gas-gathering lines will cross through creeks and areas of gilgai but potential impacts from the construction will be mitigated by using horizontal directional drilling or open trenching during zero- or low-flow periods (Epic 2024a, p. 30). Produced water will be stored at the proposed location of the gas compression facility (Epic 2024a, p. 26). The proponent is not planning controlled discharges of produced water. They propose to use untreated water for project activities, and will treat water to ensure the water quality is at a standard (from End of Waste Code Irrigation of Associated Water (DES 2019)) for other beneficial uses, including third-party agricultural, irrigation and industrial uses (RDM Hydro 2023, p. 23).

The project is in the Comet River catchment within the Fitzroy River basin (Epic 2024a, p. 101). Watercourses in the project area include Humboldt Creek, Rockland Creek, Three Mile Creek, a tributary to the Comet River, and other unnamed ephemeral watercourses (Epic 2024a, p. 101). The proposed project will not divert, extract from or discharge water to the watercourses (RDM Hydro 2023, p. 19). The proponent has assessed that uncontrolled/overflow releases could occur from the water and brine storages (Epic 2024a, p. 64). Riparian vegetation, some potentially using groundwater, provides habitat and movement corridors for EPBC Act-listed species including koala, ornamental snake and grey snake (Epic 2024a, p. 70). The EPBC Act-listed white-throated snapping turtle has been recorded in the Comet River immediately downstream of the project area (Epic 2024a, p. 70).

Response to questions

The IESC's advice in response to the requesting agency's specific questions is provided below.

Question 1: Can the Committee provide comment on whether the information provided in the PD, particularly the baseline and modelled data, and the conclusions drawn by the proponent, are sufficient to assess the project's impacts on surface and groundwater resources, GDEs and other third-party users, and cumulative impacts with other proposed and existing projects?

a. Specifically, is the baseline monitoring information provided by the proponent sufficient to provide confidence in the accuracy of the groundwater conceptualisation model given it does not meet the minimum of 2 years requested in the PD-RFI?

b. Does the groundwater conceptualisation and modelling adequately represent the Rewan Formation extent and possible variability in hydraulic properties?

c. Could groundwater drawdown propagate to the surface and impact potential White-throated snapping turtle refugial habitat or riparian vegetation?

Question 2: Can the Committee identify and discuss what, if any, additional work is needed to inform the understanding and assessment of impacts on surface and groundwater resources, and to develop a suitable management and monitoring program?

1. The information in the project documentation provided is limited. The hydraulic properties and nature of the Rewan Formation are key to restricting the propagation of CSG drawdown to the overlying aquifers. However, the current baseline data, hydraulic testing methodologies, analytical approaches, and conceptual presentations are insufficient to comprehensively characterise the Rewan Formation across the project area. This inadequacy in data and analysis limits confidence in the assessment of the Formation's effectiveness as a hydraulic barrier, contributing to uncertainties in predicting the potential impacts of CSG activities on ground and surface water resources, groundwater-dependent ecosystems (GDEs) and other third-party users, as well as potential cumulative impacts.
2. Paragraphs below provide further details of these limitations and suggest additional work to inform the understanding and assessment of potential impacts on surface and groundwater resources, in accordance with the IESC Information Guidelines (IESC 2024), and to develop a suitable management and monitoring program.
3. After this additional work has been completed, the information should be incorporated into an evidence-based ecohydrological conceptual model. This can be used to develop one or more impact pathway diagrams (Commonwealth of Australia 2024) to describe the ecological implications of all potential impact processes, including groundwater drawdown and seepage, spills, leaks or overtopping of produced water and brine storages.
4. Once the proponent has conducted further assessment of potential impacts of the project as detailed below, an assessment of cumulative impacts from the project and surrounding proposed and existing projects should be provided.

Groundwater

5. The information in the project documentation is insufficient to support the hydrogeological conceptualisation, so the reliability of the modelled results and the conclusions cannot yet be determined. The critical issue is the proponent's assertion that there is no hydraulic connection between the coals and the Tertiary aquifer, which determines whether groundwater drawdown can propagate to the surface. Although the Rewan Formation and coal interburden are likely to have very low vertical hydraulic conductivity, this needs to be measured. The baseline data do not convincingly demonstrate the large differences in potentiometric heads between the deeper and upper aquifers that would indicate little or no connectivity, particularly where the coal measures subcrop beneath the Tertiary aquifer.
6. The assumption that the Tertiary aquifer is hydraulically disconnected from the Bandanna Formation is supported by limited evidence, although substantial reliance is placed upon this disconnection in claiming there will be minimal impacts to surface-expression GDEs (RDM Hydro 2024a, pp. 31). Multiple lines of evidence are necessary to demonstrate a disconnection, such as information on well logs, permeability testing and hydrochemical and isotopic data. Nested observation piezometers should be installed to measure the difference in potentiometric head between the Tertiary aquifer and the Bandanna Formation. These piezometers should be located where there may be a connection or where such a connection would have adverse impacts: specifically, across geological faults (Murray and Power 2021), within the subcropping area of the Bandanna Formation, and the area closest to

Comet Creek. Potentiometric head maps and depth-to-watertable maps should be revised based on the new observation data.

7. The baseline groundwater data are inadequate in terms of the locations, monitored aquifers and duration. They are insufficient to justify the model conceptualisation and are unable to support calibration of the model. A more complete set of groundwater monitoring data is required.
 - a. Groundwater monitoring is limited to four active shallow bores which have only been sampled once, in August 2024 (RDM Hydro 2024b, p. 2). Additional piezometers that access and monitor all relevant geological formations are required to develop an adequate baseline (Paragraph 6).
 - b. The proponent proposes to undertake additional groundwater monitoring until two years of baseline data have been collected. Details of this proposed monitoring (e.g. frequency, analytes) are unclear. Water level and water quality data (including metals and nutrients) should be collected across an adequate spatial and temporal coverage to capture seasonality and flow trends. Baseline data should be collected prior to the commencement of the action, and detailed plans should be developed for monitoring groundwater levels and quality for the duration of and post operations (Paragraph 20).
8. The stratigraphic and hydrostratigraphic conceptualisation presented is a combination of the Queensland Office of Groundwater Impact Assessment (OGIA)'s Underground Water Impact Report (UWIR) regional model and the Comet Ridge geological model, which was not provided (RDM Hydro 2024a, pp. 29). Further information on the Comet Ridge geological model (the static reservoir model) should be provided, including cross-sections and maps showing the data used to develop it, so that the reliability can be assessed spatially.
9. Groundwater drawdown impacts have been estimated using OGIA's UWIR regional model (RDM Hydro 2024a, p. 90), and a site-specific model heavily derived from OGIA's data (RDM Hydro 2024a, p. 101). The regional OGIA model is based on limited project site data and its grid spacing of 1,500 m means that its results must be interpreted with caution for features at that scale or smaller. It does not simulate the alluvial groundwater system in the project area. The site-specific model conceptualisation and calibration are severely hampered by the scarcity of groundwater data (Terra Sana 2023, pp. 20 - 21) and its uncertainty analysis does not consider the most critical parameters. The site-specific modelling may be more fundamentally flawed as it includes an attempt to directly simulate a dual-phase well test in a single-phase modelling code. The Single Well Model History Matching appears to use the recorded pressure data from the Mahalo North 1 well test as both a calibration input and a prediction. It also represents horizontal well laterals using MODFLOW drains, without mention of correcting for the focused flow to the laterals. OGIA apply cell-to-cell (Peaceman 1978) correction to vertical wells.
 - a. Further work is required in collecting site-specific data to establish hydrological parameters to support drawdown modelling. Once additional baseline data are collected on site (Paragraphs 6 and 7), the hydrological conceptualisation and modelling should be updated to reflect this new information (at a scale appropriate for the project area, and including an improved calibration and a cumulative impact assessment).
 - b. If the Tertiary and alluvial aquifers are demonstrated to be connected to deeper groundwater in the Bandanna Formation, then the alluvial aquifer and groundwater-surface water interactions along Humbolt Creek and the Comet River will need to be characterised. If perching of groundwater occurs, an evidence-based explanation of why it occurs should be given. Additional site-specific modelling of riparian areas and other potential GDEs would be required to better understand potential impacts from the project. This modelling should occur at a scale suitable for predicting impacts to individual GDEs and should represent the connectivity between the alluvial groundwater system, underlying groundwater systems and overlying surface waters and GDEs.

The results of field surveys (see Paragraph 7b) to better map and characterise the heterogeneity of the Tertiary Strata should also be incorporated into the modelling process.

Surface Water

10. The surface water assessment was limited. The proponent states that “Neither model predicted drawdown in excess of 0.2 m to the water table. There is therefore unlikely to be reduction in baseflow associated with CSG production by the Project, and hence the Project would not change the flow regime of surface water flows” (Epic 2024a, p. 120). However, due to the limited conceptualisation and baseline data of the groundwater system (Paragraph 6), the potential impact pathway of groundwater drawdown changing the frequency of ecologically relevant flow pulses and/or durations and timing of zero flow periods within Comet River and Humboldt Creek cannot be sufficiently assessed. In ephemeral streams, flow duration and timing are crucial to many aquatic animals, especially invertebrates, some fish and amphibians (Datry et al. 2017). The proponent should assess whether drawdown may reduce flow duration and/or alter its timing in these streams.
11. Construction of roads and gathering lines is likely to impact on surface drainage lines and overland runoff patterns in this flat landscape. Although construction of roads and gathering lines is discussed (Epic 2024a, p. 63), limited baseline data on flow regimes for local watercourses are used to support the conclusion that the project will not cause changes to surface flow regime. Baseline data of the flow regime of surface water features in and near the project area should be collected to understand ecologically important flow components (Paragraph 10) and inform assessment of potential impacts from construction and other activities.
12. Limited baseline data for water quality are presented in the CSG Management Plan (RDM Hydro 2023). Prior to commencement of the proposed project, the proponent should collect site-specific water quality data during periods of flow to determine potential impacts of any future spills (see Paragraph 13).
13. The potential for contamination of surface water and shallow alluvial groundwater from seepage, accidental spills, leaks or overtopping of produced water and brine storages is not addressed in detail. Information is needed about the design capacity of the storages, including the probability of overtopping during extreme rain events.
14. If the proponent proposes to dispose of drilling cutting/mud by spreading or spraying on site (Epic 2024a, p. 149), the potential impacts of mobilisation of contaminants into downstream water resources via run-off or seepage should be assessed.

Ecology

15. As discussed in Paragraph 6, insufficient evidence is provided for hydraulic disconnection between the Bandanna Formation and the Tertiary and alluvial aquifers. Once additional groundwater data have been collected and modelling is updated as required (see Paragraphs 6 and 7), the proponent should reassess the potential for, and likely impacts to, GDEs in and around the project area.
16. The proponent has not characterised the alluvial aquifer system or groundwater-surface water interactions along Humboldt Creek and the Comet River. Baseline data are needed to improve and inform conceptualisations of aquatic and riparian ecosystems of the creeks, their temporal dependence on groundwater (Paragraph 17) and their use by water-dependent flora and fauna, including the EPBC Act-listed white-throated snapping turtle (Paragraph 18).
17. Some work has been undertaken to characterise the groundwater dependence of aquatic and terrestrial ecosystems in the project area (DPM 2023, Watermark Eco 2024). However, there is currently not enough spatial and temporal data to adequately assess groundwater dependence, and there is not enough site-specific bore data (see Paragraph 7a) associated with sampling sites to

understand the potential GDE-groundwater interactions. There have been no site-specific investigations of subterranean GDEs within and near the project area. To adequately characterise potential GDEs, additional work is required, as outlined below.

- a. The terrestrial GDE assessment has used multiple lines of evidence to assess groundwater dependence (Epic 2024b, pp. 12 - 14) but only at one sampling period. Additional sampling periods are needed to assess groundwater dependence of terrestrial vegetation over time to capture its seasonal and interannual variability, as outlined in Doody et al. (2019). Sampling should also include vegetation communities along Rockland Creek which are possibly groundwater dependent (e.g. RE 11.3.25), as well as additional sites in the southeast where vegetation is on alluvium and the water table is <10 m below ground level (RDM Hydro 2024a, Figure 30, p. 59).
 - b. Ground-truthing of potential aquatic GDEs was undertaken during aquatic ecology surveys (DPM 2023). However, there is limited information about the methods used or validation of results to assess the potential for groundwater dependence. Additionally, baseline information about the extent of the alluvium and characteristics of the alluvial aquifer have not been provided (see Paragraph 16) to be able to adequately assess the likelihood of aquatic GDE-groundwater interactions, especially within- and among-year variability. Based on the mapped depth to groundwater (RDM Hydro 2024a, Figure 30, p. 59), upstream reaches of Humboldt Creek to the south of the project area may receive groundwater contributions. If the area of project drawdown in surficial aquifers is shown to extend to this area, the potential groundwater dependence of the creek should be investigated to inform assessment of potential impacts to the aquatic and riparian GDEs and water-dependent assets.
 - c. The proponent acknowledges that there is the potential for stygofauna to be present within the alluvial and basalt aquifers (Epic 2024a, p. 111) but no site-specific investigations of subterranean GDEs have been undertaken within and near the project area. The IESC recommends that the proponent do a pilot survey of ten bores (as recommended by DSITIA 2015) in saturated alluvial sediments and basalt aquifers, especially in areas where drawdown may occur if these aquifers are affected by depressurisation in the Bandanna Formation. If this pilot survey yields stygofauna, the proponent should sample more comprehensively (DSITIA 2015) so that potential impacts of the project on stygofauna can be assessed and monitored.
 - d. Ground-truthing of GDEs and assessment of potential impacts should not be limited to within the project boundary and instead should be informed by predictions of drawdown within and surrounding the project site. If there is connection between the target formation and shallow aquifer systems, assessment of potential drawdown impacts should extend to where the Bandanna Formation subcrops beneath the Tertiary Strata to the northwest and southwest of the project area (RDM Hydro 2024a, Figure 12, p. 36) to identify potential impacts to the Comet River, its tributaries and associated GDEs.
18. Two specimens of the critically endangered white-throated snapping turtle were recorded in the Comet River downstream of the project area during the wet season field survey (DPM 2023, p. 47). This species forages in ephemeral riffle zones when streams flow but takes refuge in large slow-moving pools or isolated waterholes during the drier months. Although the project area was considered unlikely to provide suitable habitat for this turtle, its occurrence in nearby downstream receiving waters highlights the importance of protecting downstream habitats from the potential for sedimentation and other water quality impacts associated with the project (DPM 2023, p. 73). The proponent states that flows in the Comet River are unlikely to be impacted by the project (DPM 2023, p. 80). However, further information is needed to reliably assert that there will be no or negligible impacts on water quality (e.g. from spills, Paragraph 13) that may impair habitat suitability, especially if a contamination event occurs during receding flows and enters one or more refugial waterholes of the Comet River downstream of the project area.

19. The project area is in a region with existing mines nearby (e.g. South Blackwater coal mine 10 km to the east, Rolleston open-cut mine 38 km to the south), the Mahalo CSG project to the south and cropping for wheat and cotton to the immediate north-west and west (Epic 2024a, p. 63). The proponent acknowledges that these activities may be associated with cumulative impacts to ecological and groundwater values but asserts that 'no potential or likely cumulative impacts associated with the Project and surrounding projects are predicted' (Epic 2024a, p. 3). This assertion relies on limited baseline data and conceptualisations (e.g. the assumption that drawdown in the Bandanna Formation will not affect any GDEs) and does not consider other ecological impact pathways such as accidental contamination of waters or disruption of riparian connectivity. When further baseline data have been collected and the conceptualisations refined and confirmed, the proponent should reassess potential cumulative impacts from the project and from surrounding proposed and existing projects on groundwater and surface water ecosystems in and near the project area.

Question 3: Can the Committee provide comment on the adequacy of the proposed mitigation, management and monitoring measures? Does the Committee consider that any additional measures are needed to remain within the projected levels of impact or reduce risks to groundwater resources and associated users, considering the project impacts alone as well as cumulative impacts with other proposed and existing projects?

a. More specifically, are the proposed future monitoring and management plans adequate? If not, where should additional effort be focussed?

20. The proposed mitigation, management and monitoring measures provided in Section 5.5 (Epic 2024a, pp. 65 – 69) and Section 8 (Epic 2024a, pp. 153 - 172) are not adequately detailed for the proposed project. Once further baseline information has been collected (see Paragraphs 5 to 19), a detailed impact assessment for surface water, ecology and groundwater will be needed. This work should support development of detailed mitigation measures and monitoring plans for surface waters, and subterranean and terrestrial GDEs that are informed by an understanding of potential impact pathways and cumulative impacts.

21. Watercourse crossings will be required for the water- and gas-gathering lines, and the proponent has indicated that horizontal directional drilling could be used to reduce potential impacts in "environmentally constrained watercourse crossings" (Epic 2024a, p. 30). Horizontal directional drilling should be considered where riparian vegetation exists, given the importance of this vegetation in providing potential habitat to EPBC Act-listed species and promoting ecological connectivity in this landscape which has been largely cleared for grazing (Epic 2024a, p. 65).

22. The proponent should develop a monitoring program of the ecological condition of terrestrial GDEs, stygofauna (if detected) in alluvial aquifers, and surface waters (riparian zones and aquatic ecosystems) to ensure that proposed project operations do not have an impact and that this lack of impact can be demonstrated. Data from this monitoring would then guide any mitigation and remediation measures for these ecosystems if needed.

23. Limited information about locations and timings for on-going monitoring of spills and leaks for the water management system was provided. When developing the monitoring program for the water management system, the proponent could use Huynh and Hobbs (2019) as a guide. Monitoring inside the storage tanks should also be conducted including physico-chemical parameters and metals, including zinc, boron and strontium.

24. Once detailed monitoring and mitigation measures have been defined, project-specific Trigger Action Response Plans (TARPs) should be developed for all potential impact pathways. These TARPs should be designed based on the improved project conceptualisation, and implemented to ensure timely detection of, and intervention or mitigation against, potential impacts.

Date of advice	11 March 2025
Source documentation provided to the IESC for the formulation of this advice	Epic 2024a. <i>Preliminary Documentation, Mahalo North Coal Seam Gas Project: the Proposed action area (Petroleum Lease 1128), BAA220014</i> . 16. Prepared by Epic Environmental Pty Ltd (Epic) on behalf of Comet Ridge Pty Ltd. 6 December 2024.
References cited within the IESC's advice	<p>Commonwealth of Australia 2024. <i>Information Guidelines Explanatory Note: Using impact pathway diagrams based on ecohydrological conceptualisation in environmental impact assessment</i>. Report prepared for the Independent Expert Scientific Committee on Unconventional Gas Development and Large Coal Mining Development through the Department of Climate Change, Energy, the Environment and Water, Commonwealth of Australia 2024. Available [online]: Information Guidelines Explanatory Note - Using impact pathway diagrams based on ecohydrological conceptualisation in environmental impact assessment iesc.</p> <p>Datry T, Bonada N and Boulton AJ 2017. <i>Intermittent Rivers and Ephemeral Streams: Ecology and Management</i>. Elsevier, Amsterdam.</p> <p>DES 2019. <i>End of Waste Code Irrigation of Associated Water (including coal seam gas water)</i>. ENEW07546918. ESR/2019/4712. Version 1.01. State of Queensland, Department of Environment and Science. Effective 24 April 2019.</p> <p>Doody TM, Hancock PJ, Pritchard JL 2019. <i>Information Guidelines Explanatory Note: Assessing groundwater-dependent ecosystems</i>. Report prepared for the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development through the Department of the Environment and Energy, Commonwealth of Australia 2019. Available [online]: Information Guidelines Explanatory Note - Assessing groundwater-dependent ecosystems iesc.</p> <p>DPM 2023. <i>Mahalo North Coal Seam Gas Project – Aquatic Values Assessment</i>. Prepared by DPM Envirosiences Pty Ltd for Epic Environmental Pty Ltd. 14 July 2023. Appendix D of Epic 2024a.</p> <p>DSITIA 2015. <i>Guideline for the environmental assessment of subterranean aquatic fauna</i>. Department of Science, Information Technology, Innovation and the Arts, Queensland Government. Available [online]: https://www.publications.qld.gov.au/dataset/subterranean-aquatic-fauna/resource/ba880910-5117-433a-b90d-2c131874a8e6. Accessed 2 March 2025.</p> <p>Epic 2024b. <i>Matters of National Environmental Significance: Ecological Assessment Report</i>. Epic Environmental Pty Ltd (Epic) on behalf of Comet Ridge Limited. 19 November 2024. Appendix C of Epic 2024a.</p> <p>Huynh T and Hobbs D 2019. <i>Deriving site-specific guideline values for physico-chemical parameters and toxicants</i>. Report prepared for the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development through the Department of the Environment and Energy, Commonwealth of Australia 2019. Available [online]: Information Guidelines Explanatory Note - Deriving site-specific guideline values for physico-chemical parameters and toxicants iesc.</p> <p>IESC 2024. <i>Information Guidelines for proponents preparing coal seam gas and large coal mining development proposals</i>. Available [online]: Information guidelines for proponents preparing coal seam gas and large coal mining development proposals iesc.</p>

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- Peaceman DW 1978. *Interpretation of Well-Block Pressures in Numerical Reservoir Simulation* (includes associated paper 6988). Society of Petroleum Engineers Journal. 18, 183–194 (1978). Available [online]: <https://doi.org/10.2118/6893-PA>
- RDM Hydro 2023. *Mahalo North Coal Seam Gas Water Management Plan*. Prepared by RDM Hydro Pty Ltd for Comet Ridge Ltd. 31 July 2023. Appendix G of Epic 2024a.
- RDM Hydro 2024a. *Mahalo North CSG Development Groundwater Impact Assessment*. Prepared by RDM Hydro Pty Ltd for Epic Environment Pty Ltd. 6 December 2024. Appendix E of Epic 2024a.
- RDM Hydro 2024b. *Mahalo North Groundwater Monitoring Bore Completion Report*. Prepared by RDM Hydro Pty Ltd for Epic Environment Pty Ltd. 4 November 2024. Appendix B of RDM Hydro 2024a.
- Terra Sana 2023. *Groundwater Modelling Report – Mahalo North Project*. Prepared by Terra Sana Consultants for Comet Ridge Pty Ltd. September 2023. Appendix G to RDH Hydro 2024.
- Watermark Eco 2024. *Groundwater Dependent Ecosystem Assessment Mahalo North CSG Development*. Prepared by Watermark Eco for Epic Environment Pty Ltd. 4 December 2024. Appendix E of Epic 2024a.
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